

Low-Cost, Quick-Turn Radiation Tolerant Encryption Engine, Phase I

Completed Technology Project (2018 - 2019)



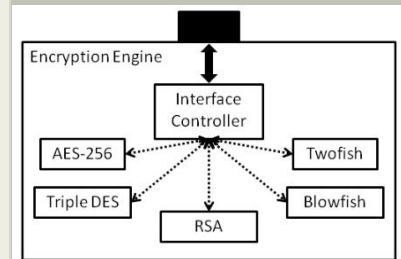
Project Introduction

Microelectronics Research Development Corporation (Micro-RDC) proposes a novel data security application specific integrated circuit (ASIC) demonstration of a radiation-hardened-by-design (RHBD) encryption engine for use in National Aeronautics and Space Administration (NASA) future missions. The Small Business Innovation Research (SBIR) developed encryption engine will be researched, developed and implemented on Micro-RDC's existing 90nm qualified manufacturing list (QML-Q) Structured ASIC (SASIC) product platform. The SASIC platform implementation of the encryption engine will be a low-cost, quick-turn radiation hardened solution to increase data security in space applications and to migrate legacy designs to a more modern technology or to develop new designs in a simple, user-friendly electronic design automation (EDA) flow. Common encryption protocols are Triple DES, RSA, Blowfish, Twofish, and AES. The proposed encryption engine will utilize a maximum coverage of these protocols. 256-bit AES will be the primary target for the research and development under this proposed SBIR effort. The other remaining protocols will be investigated with available resources, or as directed by NASA oversight for current and future mission needs. The goal of this proposed project is to develop a radiation hardened encryption engine, comparable in performance to existing commercial counterparts, that can be configured to achieve various reliable security protocols. The proven RHBD techniques utilized in Micro-RDC's SASIC will ensure no data errors and zero data loss will occur in either deep space or Low Earth Orbit (LEO) implementations. The encryption engine device will be a standard product upon the successful completion of this SBIR Phase I and II efforts. The resulting RHBD engine will be marketed to system integrators, researchers and prime contractors alike.

Anticipated Benefits

NASA will benefit from this RHBD multipurpose encryption engine. The encryption engine, designed on the 90nm Structured ASIC (SASIC), will have zero data loss or data corruption. It will be applicable to any NASA mission that requires data security and provides a simple solution to support many of the most common encryption/decryption schemes. The demonstration platform capabilities apply throughout NASA for both legacy designs migrating forward and new designs requiring low-cost, quick-turns.

Reconnaissance and communications missions requiring secured data will benefit from both the encryption engine and the SASIC platform that the engine is demonstrating. These missions have requirements of taking data security and low-cost, quick-turn manufacturing solutions into consideration prior to defining the system. The secure technologies that result will fulfill a market need of advanced technology processes with reasonable costs and lead-time for defense and aerospace industries.



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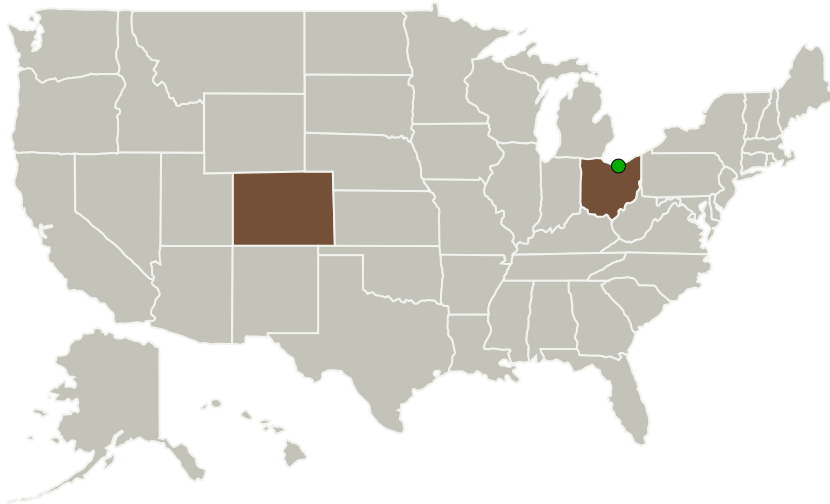
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Microelectronics Research Development Corporation	Lead Organization	Industry	Colorado Springs, Colorado
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Colorado	Ohio

Project Transitions

▶ **July 2018:** Project Start

✓ **February 2019:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137858>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Microelectronics Research Development Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

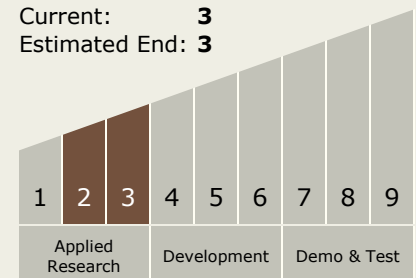
Carlos Torrez

Principal Investigator:

Paul Eaton

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**

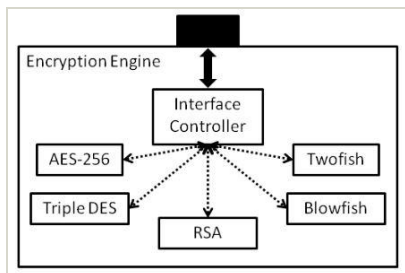


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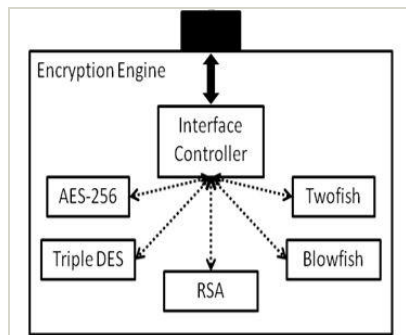


Images



Briefing Chart Image

Low-Cost, Quick-Turn Radiation Tolerant Encryption Engine, Phase I (<https://techport.nasa.gov/image/135037>)



Final Summary Chart Image

Low-Cost, Quick-Turn Radiation Tolerant Encryption Engine, Phase I (<https://techport.nasa.gov/image/129590>)

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - └ TX11.4 Information Processing
 - └ TX11.4.4 Collaborative Science and Engineering

Target Destination

Earth